Racial and Age Related Differences in Lumbar Facet Joint Orientation

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Disclosures: All the authors have no relevant financial disclosures or conflicts of to disclose.

INTRODUCTION: Facet joint arthritis and degenerative spondylolisthesis (DS) can lead to chronic back pain, abnormal lordotic lumbar curvature, postural changes, and spinal stenosis. Facet joint orientation refers to the joint's position in space and has been studied both biomechanically and *in vivo*. Lumbar facet joints support about 1/3 of the dynamic and static compressive loads of the spine and play an important role in age-related pathological spine conditions, such as degenerative spondylolisthesis (DS). In this study we examined facet joint orientation using CT scan in adult patients, and sought to determine whether associations exist between age and race in facet joint orientation in the lumbar spine.

METHODS: A retrospective review of 1,000 CT scans were obtained for analysis from our institution's picture archiving and communication system (PACS) imaging system. Patients were stratified according to age, from 20 to 100 years old at 10 year intervals. Facet joint angulation was calculated by taking selected axial images where the facet joints were the most closely bisected at each level. Baseline demographic profiles between the stratified age cohorts were analyzed using Pearson's Chi-Square Analyses or Fischer's Exact Test. Continuous variables were assessed using Analysis of Variance (ANOVA); and reported as the means ± standard deviations (SD). Tukey's post-hoc analysis was performed to determine where statistical differences between the cohorts.

RESULTS SECTION: There were no statistically significant differences in facet joint orientation as related to sex or side at any lumbar level or age group (p>0.05). Facet joint orientation decreased in the sagittal plane from cephalad to caudad and increased progressively in the sagittal plane with respect to age. There was a statistically significant difference in average sagittal orientation across all ages with respect to race, this was notable at all lumbar levels and post-hoc analysis revealed the most consist difference between Asian and other races. At all lumbar levels except L5/S1 facet joints had statistically less sagittal orientation, averaged across all ages, for Hispanic vs Non-Hispanic patients.

DISCUSSION: Facet joint orientation becomes more sagittal with respect to age at all lumbar levels. While there was no significant difference when comparing side or sex, there was a significant difference with respect to race and ethnicity with Asian and Hispanic patients having less sagittal oriented facet joints. It is possible that as facet joint orientation changes, forces alter to provide an impetus for degenerative lumbar spine disorders. Continued investigations are necessary to assess the causality the role of facet joint orientation in the development of a degenerative spondylolisthesis.

SIGNIFICANCE/CLINICAL RELEVANCE: The current study offers novel contribution in understanding race and age related differences in lumbar facet joint orientation. These relationships may subsequently lead to differential development of degenerative lumbar spine disorders.